

We claim:

1           **1.**       A method for assaying angiogenesis *ex vivo*, said method comprising the steps  
2 of:

3           **(a)**       embedding a three-dimensional mammalian tissue sample in a matrix, wherein  
4 the tissue sample has at least one cut surface exposing blood vessels;

5           **(b)**       supplying to the embedded tissue sample a medium that supports the growth of  
6 the tissue sample;

7           **(c)**       incubating the embedded tissue sample in the medium for a time sufficient to  
8 allow angiogenic vessels, if any, to grow into the matrix surrounding the tissue  
9 sample; and

10          **(d)**       observing or measuring the angiogenic vessels, if any, that grow into the matrix  
11 surrounding the tissue sample.

1           **2.**       A method as recited in Claim 1, wherein the medium comprises a serum-free  
2 medium that supports the growth of the tissue sample; wherein the medium contains  
3 substantially no exogenous angiogenesis-enhancing factors and substantially no exogenous  
4 angiogenesis-suppressing factors.

1           **3.**       A method as recited in Claim 1, wherein the medium comprises serum.

1           **4.**       A method as recited in Claim 1, wherein the medium comprises an angiogenesis-  
2 enhancing factor.

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1           **5.**       A method as recited in Claim 4, wherein the angiogenesis-enhancing factor is  
2 selected from the group consisting of platelet-derived growth factor, vascular endothelial growth  
3 factor, epidermal growth factor, fibroblast growth factor, and transforming growth factor  $\beta$ .

1           **6.**       A method as recited in Claim 1, wherein the matrix comprises fibrin.

1           **7.**       A method as recited in Claim 1, wherein the matrix comprises collagen.

1           **8.**       A method as recited in Claim 1, wherein the matrix comprises gelatin.

1           **9.**       A method as recited in Claim 1, wherein the matrix comprises agarose, agar,  
2 alginate, or silica gel.

1           **10.**      A method as recited in Claim 1, wherein the matrix comprises Matrigel.

1           **11.**      A method as recited in Claim 1, wherein the tissue sample is a tumor fragment.

1           **12.**      A method as recited in Claim 1, wherein the tissue sample is not a tumor  
2 fragment, and wherein the tissue sample is not an isolated segment of an artery or vein.

1           **13.**      A method as recited in Claim 1, additionally comprising the step of supplying an  
2 additional factor to the embedded tissue sample, and measuring the difference in angiogenesis  
3 for the tissue sample as compared to the angiogenesis of an otherwise identical and otherwise  
4 identically-treated control tissue sample that is not supplied with the factor; whereby the  
5 difference in observed angiogenesis is a measure of the angiogenic enhancement or angiogenic  
6 suppression characteristics of the supplied factor.

- 1           **14.**     A method for growing a tissue *ex vivo*, said method comprising the steps of:
- 2           **(a)**     embedding a three-dimensional mammalian tissue sample in a matrix, wherein
- 3                     the tissue sample has at least one cut surface exposing blood vessels;
- 4           **(b)**     supplying to the embedded tissue sample a medium that supports the growth of
- 5                     the tissue sample; and
- 6           **(c)**     incubating the embedded tissue sample in the medium for a time sufficient to
- 7                     allow angiogenic vessels to grow into the matrix surrounding the tissue sample;
- 8                     and to allow the number of cells in the tissue to proliferate, so that the tissue's
- 9                     suitability for transplant is improved.
- 1           **15.**     A method as recited in Claim 14, wherein the medium comprises serum.
- 1           **16.**     A method as recited in Claim 14, wherein the medium comprises an
- 2                     angiogenesis-enhancing factor.
- 1           **17.**     A method as recited in Claim 16, wherein the angiogenesis-enhancing factor is
- 2                     selected from the group consisting of platelet-derived growth factor, vascular endothelial growth
- 3                     factor, epidermal growth factor, fibroblast growth factor, and transforming growth factor  $\beta$ .
- 1           **18.**     A method as recited in Claim 14, wherein the matrix comprises fibrin.
- 1           **19.**     A method as recited in Claim 14, wherein the matrix comprises collagen.
- 1           **20.**     A method as recited in Claim 14, wherein the matrix comprises gelatin.

1           **21.**     A method as recited in Claim 14, wherein the matrix comprises agarose, agar,  
2 alginate, or silica gel.

1           **22.**     A method as recited in Claim 14, wherein the matrix comprises Matrigel.

1           **23.**     A method as recited in Claim 14, wherein the tissue sample is selected from the  
2 group consisting of skin tissue, parathyroid tissue, thyroid tissue, pituitary tissue, adrenal tissue,  
3 pancreas tissue, cardiac muscle tissue, skeletal muscle tissue, retina tissue, kidney tissue, liver  
4 tissue, and prostate tissue.

1           **24.**     A method as recited in Claim 14, additionally comprising the subsequent step of  
2 transplanting the incubated embedded tissue sample with angiogenic vessels into a host in need  
3 of such a transplant.

1           **25.**     A method as recited in Claim 14, wherein said incubating step is conducted for  
2 a time sufficient for the mass of the tissue to increase by at least about 25%.

1           **26.**     A method as recited in Claim 25, additionally comprising the subsequent step of  
2 transplanting the incubated embedded tissue sample with angiogenic vessels into a host in need  
3 of such a transplant.

1           **27.**     A tissue with angiogenic vessels produced by the method of Claim 14.

1           **28.**     A tissue with angiogenic vessels produced by the method of Claim 15.

1           **29.**     A tissue with angiogenic vessels produced by the method of Claim 16.

1           **30.**     A tissue with angiogenic vessels produced by the method of Claim 17.

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- 1        **31.**    A tissue with angiogenic vessels produced by the method of Claim 18.
- 1        **32.**    A tissue with angiogenic vessels produced by the method of Claim 19.
- 1        **33.**    A tissue with angiogenic vessels produced by the method of Claim 20.
- 1        **34.**    A tissue with angiogenic vessels produced by the method of Claim 21.
- 1        **35.**    A tissue with angiogenic vessels produced by the method of Claim 22.
- 1        **36.**    A tissue with angiogenic vessels produced by the method of Claim 23.
- 1        **37.**    A tissue with angiogenic vessels produced by the method of Claim 25.